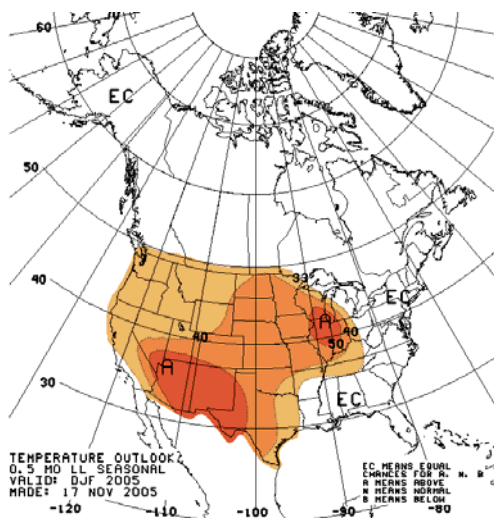


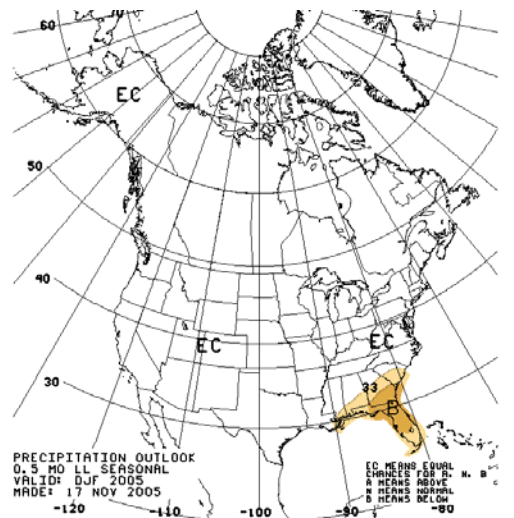
The Winter outlook for northeast Montana and Madden-Julian Oscillation explained

By Corey Bogel, General Forecaster

The latest official climate outlook (issued October 20, 2005) from the Climate Prediction Center (CPC) is for warmer-than-average temperatures for much of the central and western United States, including Alaska and Hawaii this coming winter. The Midwest, the Mississippi Valley, the Southern Californian coast and the East Coast have equal chances of above, near, or below normal temperatures. Across northeast Montana there is a slight chance of above normal temperatures.



*Dec-Jan-Feb **Temperature** outlook*



*Dec-Jan-Feb **Precipitation** outlook*

EC refers to equal chances of above or below normal conditions.

The precipitation outlook calls for wetter-than-average conditions across most of Arkansas, Louisiana, Oklahoma, northeastern Texas, Hawaii and northwestern Alaska. The remainder of the country, including Northeast Montana has equal chances of above, near or below normal precipitation.

An equal chance, either for temperature or precipitation, is predicted when there is no strong or consistent climate signal for either an above or below normal conditions during the season.

The current forecast is for ENSO-neutral conditions to continue through the upcoming winter. Enso-neutral refers to those periods when neither El Nino nor La Nina is present. These periods often coincide with the transition between El Nino and La Nina Events. The weak El Nino that developed during the summer of 2004 and persisted through last winter transitioned into Enso-Neutral conditions this past spring.

Shorter term climate fluctuations that are best predicted week-by-week are expected to play the

dominate role on the weather pattern this winter. One such shorter-term climate fluctuation is the Madden-Julian Oscillation or MJO. The MJO is a naturally occurring component of our coupled ocean-atmosphere system. It significantly affects the atmospheric circulation throughout the global tropics and subtropics, and also strongly affects the wintertime jet stream and atmospheric circulation features over the North Pacific and western North America.

The MJO is characterized by an eastward progression of large regions of both enhanced and suppressed tropical rainfall, observed mainly over the Indian Ocean and Pacific Ocean. Each cycle of the MJO usually lasts for between 30 and 60 days.

There is strong year-to-year variability in MJO activity, with long periods of strong activity followed by periods in which the oscillation is weak or absent. This interannual variability of the MJO is partly linked to the ENSO cycle. Strong MJO activity is often observed during weak La Niña years or during ENSO-neutral years, while weak or absent MJO activity is typically associated with strong El Niño episodes.

Will the MJO have an impact on our weather this winter across northeast Montana? Yes, it probably will have an impact on our weather this winter as strong MJO activity usually occurs during ENSO neutral conditions. The strongest effects are usually felt in California and across the Pacific Northwest. As tropical rainfall pushes east across the Pacific Ocean toward the dateline and diminishes the moisture plum associated with the tropical rainfall can cause a trough of low pressure in the upper levels of the Earth's atmosphere to develop off the West Coast of the United States.

The flow around this upper trough can transport a deep layer of moisture into the western United States. You may have heard the expression the "Pineapple Express?" A significant amount of the moisture in these MJO events traverses the Hawaiian Islands on its way towards the western US. In addition, the MJO can have significant effects on the Jet stream (winds about 20,000-30,000 above the Earth's surface). It can, in part, be responsible for producing periods of relatively mild and tranquil weather, or bitterly cold arctic outbreaks and snowfall across northeast Montana.

It is still too early to say just how much of an impact the MJO will have on our weather this winter, but it is one of many short term climate variabilities that meteorologists will be monitoring this winter.

How do scientists monitor the MJO and predict their evolution? Computer models generally do not do a good job at predicting the development or life cycle of the MJO. Polar-orbiting and geostationary satellites are the primary tool used to monitor for areas of increased or decreased tropical rainfall. A secondary source of data is the radiosonde network across the world. Weather balloons are released at over 900 locations around the world twice a day, and collect crucial information regarding the atmospheric winds, temperature, moisture, and pressure at many levels of the atmosphere.

Your local National Weather Service office in Glasgow is part of this radiosonde network. If you are interested in observing first hand a radiosonde launch, please call our office at 228-4042 and make an appointment.

The data observed from the radiosonde are assimilated by dynamical weather prediction models into formats that are highly efficient for climate analysis and numerical weather prediction. In combination with the satellite-derived rainfall and convection patterns, these observations provide meteorologists with the capability to routinely monitor and assess the MJO and its evolution.

If you have any questions concerning the MJO and its impact on the weather in northeast Montana, please contact either Donald Simonsen, the climate focal point, or Corey Bogel, the assistant climate focal point.

To see the latest climate outlooks which are issued in the third week of the month, you can go to [http://www.cpc.noaa.gov/products/predictions/30 day/](http://www.cpc.noaa.gov/products/predictions/30_day/). If you are interested in learning more about the MJO, you can go to http://www.cpc.ncep.noaa.gov/products/intraseasonal/intraseasonal_faq.html#how